

# ANALYZING ARCHIVED WATER MONITORING DATA FOR TEMPORAL PATTERNS

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## Biographical Sketch of Authors

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## Abstract

Vast amounts of historical water-quality data have accumulated in STORET and in monitoring-data archives. Many of these data were acquired by state agencies for the purpose of water-quality assessments required by the Clean Water Act. Analysis and interpretation of such data can aid water-quality management in the present day. Such data sets – even when assembled with a high level of analytical accuracy – can present interpretation challenges due to inconsistencies of sampling and recording that may have been appropriate for the monitoring program's intended purpose. The presentation summarizes the authors' experience in analyzing and interpreting such a data set, collected by Virginia Department of Environmental Quality beginning in the late 1960s. Nine variables at 180 locations were analyzed for trend over the 1978-1995 period using the seasonal Kendall technique, median levels were determined for each variable at each location, and the results were interpreted spatially. The data set is characterized by several important attributes which allow advanced analysis:

- *A consistent sampling strategy:* A fixed-interval sampling strategy was maintained by the agency since the origin of its monitoring program.
- *Consistent laboratory protocols:* Water monitoring samples have been analyzed in a state laboratory since the monitoring program began. The state lab uses EPA methods, and maintains quality assurance – quality control procedures, including multiple comparison of paired samples to assure analytical consistency across all changes in laboratory equipment and procedures.

Characteristics of the data set that present challenges to advanced analysis include varying numbers of observations between variables and locations, variations in detection limits and precision due to the use of increasingly sensitive analytical procedures, large numbers of detection limited observations for some variables during some time periods, variation in analysis of nitrogen compounds, and lack of flow data at most locations. The presentation will review techniques developed and used by the authors to accommodate these and other analysis and interpretation issues.